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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/774,192	01/29/2001	Maocheng Li	5430/ETCH/SILICON/JBI	7295

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APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER

CROWELL, ANNA M

ART UNIT PAPER NUMBER

1763

DATE MAILED: 01/27/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/774,192

Applicant(s)

LI ET AL.

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18, 20-28 and 33-42 is/are pending in the application.
- 4a) Of the above claim(s) 3, 16-18 and 22-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-2, 4-15, 20, 21, 28, 33-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 14-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claim 14 recites the limitation "the substrate" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 4-5, 28, 33-40, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guo et al. (U.S. 5,944,899) in view of Yoshida (U.S. 5,735,993).

Referring to Figure 1 and column 2, line 51 – column 3, line 33, Guo discloses an inductively coupled plasma reactor comprising a vacuum chamber 11 (semiconductor processing chamber), conductive wafer pedestal 22 (wafer support), gas distribution system 19 (gas delivery channel), and quartz dome 17 (dome-shaped lid, hemispherical-shaped lid), flange 18, sidewalls 14, base member 12 making up the chamber walls. A helical shaped RF induction coil 25 is

disposed near the outside of the quartz dome. In addition, a fan 30, 31 is provided to exhaust the air in the annular space 26.

Guo fails to teach the heating element and a Faraday shield.

Referring to Figures 1, 2, and 7, column 3, line 51 – column 4, line 11, column 4, lines 29-57, and column 5, line 63- column 6, line 14, Yoshida teaches a plasma processing apparatus which uses a metallic resistor plate 3 (heating element, Faraday shield) to reduce capacitive coupling in the plasma and to heat the dielectric plate 2 (flat lid chamber wall). In Figure 7, both metallic resistor plate 1a (Faraday shield) and heater 1b (electrical, resistive heating element) are located in the dielectric plate 2 and have a circular shape with a plurality of radial slits 12. Metallic plate 1a (Faraday shield) acts in an electromagnetic-wave transmission function and heater 1b uniformly heats the dielectric plate 2. By using the metallic plate 1a, capacitive coupling is reduced and hence sputtering of the dielectric plate 2 is prevented. By controlling the heat of the dielectric, deposition of etching products on the dielectric plate 2 is suppressed. Furthermore, by reducing capacitive coupling and controlling the heat of the dielectric plate 2, the problem of contaminating particle generation is alleviated and etching condition stability is increased.

A temperature measuring element 6 (temperature sensor) measures the temperature of the dielectric plate 2 and a current controller 7 (power control circuit) controls the current supplied to the heater based on the feedback from the temperature measuring element 6. From Figure 7, the heater 1b is positioned between the flat spiral coil 1 (RF coil) and the dielectric plate 2 (chamber wall), and metallic plate 1a (Faraday shield) is situated between the heater 1b and the dielectric plate 2.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the chamber wall of Guo with the heating element and Faraday shield. This would reduce capacitive coupling in the plasma and prevent contaminants from forming on the dielectric plate, thereby alleviating the problem of contaminating particle generation and increasing etching condition stability.

6. Claims 6-15, 20-21, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guo et al. (U.S. 5,944,899) in view of Yoshida (U.S. 5,735,993) as applied to claims 1, 2, 4-5, 28, 33-40, and 42 above, and further in view of Yin et al. (WO 00/52973) and Rice et al. (U.S. 6,095,083).

Guo in view of Yoshida fail to teach a heating element layered over the Faraday shield and a gap.

Referring to Figure 1 and column 13, lines 14-36, Yin teaches a resistive heater 170 layered over an anode electrode 168 (Faraday shield). In order to maintain a clean anode electrode 168, the electrode 168 is heated using the resistive heater 170. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the heating element and Faraday shield of Guo in view of Yoshida with heating element layered over the Faraday shield as taught by Yin. This would maintain a clean Faraday shield.

Referring to Figure 29, column 33, lines 43-48, Rice describes a radial slit 4060 (gap) placed in the heated silicon ring 62 (circular element). The slit promotes greater thermal expansion of the silicon ring 62 without breakage. Thus, it would have been obvious to provide

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the Faraday shield of Guo in view of Yoshida with a gap as taught by Rice. The Faraday shield will be capable of thermally expanding without breaking.

Response to Arguments

7. Applicant's arguments filed November 12, 2002 have been fully considered but they are not persuasive.

1. Applicant has argued that the embedded structures of Yoshida are certainly distinct from the relationship of elements lain on atop the other as recited in the claims.

Claims 1 and 28 do not preclude the Faraday shield and heating element from being embedded inside the chamber ceiling. Furthermore, claims 1 and 28 do not require that the heating element is lain atop of the Faraday shield. Claims 1 and 28 requires that the Faraday shield is disposed between the heating element and the chamber wall and Yoshida satisfies this requirement. The term "between" must be given its broadest interpretation.

2. Applicant has argued that the present invention layers the unshielded heating element over a Faraday shield atop the chamber wall.

Yin satisfies this requirement by teaching a heating element layered over a Faraday shield. Furthermore, claim 6 does require that the Faraday shield atop the chamber wall.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

AMC *AMC*
January 21, 2003

[Signature]
GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700